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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,681	03/23/2004	Hideto Sugawara	81912.0009	1159

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EXAMINER
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SARKAR, ASOK K

ART UNIT	PAPER NUMBER
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2891

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/806,681	Applicant(s) SUGAWARA ET AL.	
	Examiner Asok K. Sarkar	Art Unit 2891	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 December 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6 and 16 is/are rejected.
- 7) ☒ Claim(s) 3,4,7,8 and 17-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/21/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group I claims 1 – 8 and 16 – 20 in the reply filed on December 5, 2005 is acknowledged.
2. Claims 9 – 15 were withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II claims, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on December 5, 2005.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Duggan, US 6,072,189.

Regarding claim 1, Duggan teaches a group – III nitride semiconductor stack, comprising:

- single-crystal substrate 1 (see Fig. 1);
- first group – III nitride layer 2 formed on a principal surface of the single – crystal substrate (see Fig. 1);

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- a graded low – temperature deposited layer formed on the group – III nitride layer and made of nitride in which group – III element composition is continuously changed with respect to Fig. 7; and
- a second group – III nitride layer 4 formed on the graded low – temperature deposited layer (see Fig. 1) in detailed description part of their disclosure starting in column 6 and particularly in column 10, lines 12 – 23.

Regarding claim 2, Duggan teaches the graded low-temperature deposited layer is continuous with the first and second group - III nitride layers in terms of composition and represented by a compositional formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  in which a composition ratio  $x$  changes between 0 and 1 in column 8, lines 28 – 67.

Regarding claim 6, Duggan teaches the number of the graded low – temperature deposited layers formed is more than 1 in column 10, lines 12 – 23.

5. Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by Redwing, US 5,874,747.

Redwing teaches a group – III nitride semiconductor device, comprising:

- single – crystal substrate 77 (see Figs. 7 and 9);
- an undoped group – III nitride layer 76 formed on a principal surface of the single – crystal substrate (see Fig. 9);
- a graded low – temperature deposited layer 75 which is formed on the undoped group – III nitride layer and in which group – III element composition is continuously changed (see Fig. 9);

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- an n – type group – III nitride contact/cladding layer 74 formed on the graded low – temperature deposited layer (see Figs. 7 and 9);
- a group - III nitride MQW active layer 44 formed on the n – type group – III nitride contact/cladding layer (see Fig. 7);
- a p – type group – III nitride cladding layer 43 formed on the group – III nitride MQW active layer (see Fig. 7); and
- a p – type group – III nitride contact layer 42 formed on the p-type group – III nitride cladding layer (see Fig. 7) and discussions related to Figs 7 and 9 in between column 16, line 21 and column 19, line 65.

Redwing teaches low temperature growth of buffer and graded layers under the description of the related art sections especially in column 5.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duggan, US 6,072,189 in view of Redwing, US 5,874,747.

Duggan teaches first group III nitride layer as undoped GaN and second group III nitride as n – type GaN, but fail to teach it as Si – doped.

Redwing teaches that GaN can be doped with Si to make it n – doped in column 19, lines 55 – 60 for the benefit of increasing the quantum efficiency of GaN – based LED devices in column 1, lines 19 – 30.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Duggan and use Si as the dopant for the n – type GaN layer for the benefit of increasing the quantum efficiency of GaN – based LED devices as taught by Duggan in column 1, lines 19 – 30.

***Allowable Subject Matter***

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10. Claims 3, 4, 7, 8 and 17 – 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Asok K. Sarkar  
December 19, 2005

Primary Examiner